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NUTRITION NOTES FOR TEACHERS

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BY

MARY G. McCORMICK

State Supervisor of Health Teaching

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FOREWORD

This bulletin has been prepared by Mary G. McCormick, State Supervisor of Health Teaching, for the purpose of putting into the hands of the classroom teacher the simple principles of nutrition as a fundamental part of health teaching.

"The health, growth and physical development of children, and to a considerable degree their mental development and progress," said the late Dr L. Emmet Holt, "depend upon their nutrition. . . . Health and normal nutrition are not quite synonymous terms; yet as applied to children during the period of growth they are so closely allied that one may be taken as an index of the other. While there may be normal nutrition without health, there can not be health without normal nutrition."

Probably no phase of education, particularly of health training, is more vital or has been more generally neglected than food values in body building. Too much of our health work has been merely inspectional in character. We have been too concerned in the work of the repair shop and have shown too little interest in the materials going into construction.

There is, however, a positive constructive side to health teaching. It is of primary interest to do everything possible to insure a strong body.

"We strike at one of the roots of physical unfitness when we begin the teaching of food selection to all children, regardless of whether they appear to be undernourished or not."

This statement from the recent report of the joint committee on health problems in education of the National Education Association and the American Medical Association indicates clearly the place of nutrition in the school program.

Children and youth should be so instructed that these habits and principles of living will become a part of their lives. Only in this way can we "assure that abundant vigor and vitality which provide the basis for the greatest possible happiness and service in personal, family and community life."

This bulletin should prove very helpful to classroom teachers and to those who are in supervisory positions either in the teaching service or in teacher-training institutions.

GEORGE M. WILEY

Assistant Commissioner of Education

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NUTRITION NOTES FOR TEACHERS

INTRODUCTION

Research work has demonstrated conclusively that good nutrition is essential to normal growth and to health. For the construction of sound teeth and bones, organs, muscles, nerves and skin, chemical substances in adequate amounts must be supplied. The food is the only source of these substances. If all foods were identical in composition and richly supplied with all the needed elements, no choice would be necessary. Since foods differ profoundly in their chemical composition, however, an intelligent selection is imperative. Moreover, food serves other than building purposes. It must supply the body daily with an amount of energy equivalent to the amount expended by the body and it must also provide the vitamins.

Careful observation has led to the conclusion that certain diseases are due to dietary deficiencies — beriberi and pellagra, xerophthalmia, scurvy and rickets. With the exception of scurvy and rickets these disorders may perhaps seem antipodean and arouse but feeble interest; research work, however, has also demonstrated that sound teeth and one's resistance to diseases of the lungs are also dependent on a wisely chosen diet. While studies of food habits indicate that people may be taught to select food wisely, it is undoubtedly true that many persons unfamiliar with food values, are attempting to live on diets which have been demonstrated in animal experimentation to result in nutritive failure of one kind or another.

The availability of increasing numbers of foods, the unwarranted claims often made in advertising, the fads and false notions commonly held about the merits and demerits of specific foods make it necessary for the teacher to have a storehouse of accurate information on the nutritive properties of the common articles of diet. This bulletin has been prepared as a guide to teachers. It aims to give

to the teachers facts in nutrition which have not yet been introduced into the schoolroom literature and which at present are available only to those who have access to advanced textbooks and to scientific periodicals. It is hoped that the teachers will measure their success in teaching nutrition not only by the information they impart but by their ability to teach their pupils to adopt good food practices.

A section of the bulletin is devoted to a consideration of the nutritive requirements of the teachers themselves. Their teaching will be most effective when they have experienced in their own lives the beneficial effects of an adequate diet.

This publication is a revision of Bulletin 932, Nutrition Notes for Elementary Teachers.

ESSENTIALS OF AN ADEQUATE DIET FOR CHILDREN
OF SCHOOL AGE¹

At least one pint of milk	{ One quart of milk a day is the desirable quantity for children. A full glass of milk at each meal supplemented by the milk used in preparing other foods will give a total of approximately one quart a day.
Vegetables	{ Potatoes every day — boiled, baked, scalloped, creamed or in soup; not fried. At least one other vegetable daily; this second vegetable should be a leafy vegetable, several times a week. (See pages 20 and 21 for list.) { Tomatoes fresh or canned and carrots should be used frequently. Three servings of vegetables a day are desirable.
Fruit	{ Fresh fruit every day if possible. If this is too expensive, fresh fruit two or three times a week and cooked dried fruit on the other days of the week. { In the absence of fresh fruit, fresh or canned tomatoes, raw cabbage, raw carrots and raw turnips should be eaten more frequently.
Whole grains	{ The daily use of cereal is advisable and the whole grain cereals should predominate. Cereals and milk are not only a valuable part of the breakfast; they are a wholesome item in the evening meal also.
Bread and butter	{ Bread and butter may well be included in each meal. Whole grain bread which has superior building properties to white bread should be used often.

Whatever the other dietary customs of the family may be, these foods should constitute the foundation of the child's diet.

¹These dietary recommendations apply to well children. Diet for sick children is a separate problem and can not be treated here.

OBJECTIVES IN A SCHOOL NUTRITION PROGRAM

Since sound teeth, high resistance to diseases of the lungs, normal skeletal development as well as the normal development of all other parts of the body are largely dependent on a wisely chosen diet, lessons on the nutritive requirements are of supreme importance to the child. The objectives in a nutrition program are:

- 1 The establishment early among the children of good food practices
- 2 The development of the right attitude toward food
- 3 Information about the nutritive requirements
- 4 In every child that state of physical prosperity commonly called "good nutrition"

CRITERIONS OF GOOD NUTRITION

Growth. A child who is growing normally will show increases in height and weight during the year. The research work carried on by the American Child Health Association has revealed the fact that there is a close relationship between the weight of children and certain physical characteristics, such as girth of hips and girth and depth of chest. Other physical characteristics that may be measured objectively also have diagnostic value. Suitable devices for making these measurements in the classroom, however, have not yet been placed on the market.

Since the children normally should be increasing in height and weight, they should be weighed frequently, ideally monthly, and their weight recorded on the classroom Growth Record Chart. While the rate of growth may not be constant, the trend should always be upward. In a child stationary weight over a long period of time or a decline in weight should be a matter of concern to parents and teachers.

This research study of the American Child Health Association demonstrated clearly that there is no relationship between the weight of children and their height. The use of the height-weight-age tables therefore should be discontinued. Such terms as "10 per cent underweight" are now meaningless and should be abandoned.

Firm flesh. Firm flesh implies muscular development and is another indication of good nutrition. If the general tone of the muscles is poor and the posture is not good, the child is manifesting one sign of poor nutrition. Diets low in building materials but high

in calories may lead to a storage of body fat. A body, therefore, may have a large amount of body fat and yet be in a state of poor nutrition.

Subcutaneous fat. A moderate amount of subcutaneous fat is another indication of good nutrition. Body fat serves several purposes: it acts as a packing for the organs; it protects the tissues against bruises; it conserves body heat; it is a reserve store of fuel.

Good teeth. Good teeth are also an indication of good nutrition. Dental research has established the fact that the formation of good teeth is largely dependent on the presence of certain substances in the diet. It is especially important that these substances be freely supplied during the period of tooth formation. The diet of the mother during pregnancy and lactation and the diet of the child during the period of growth are of the utmost importance for the construction of sound teeth. Recent research has demonstrated that even after the second teeth are fully formed and erupted, an adequate diet helps to preserve their soundness. Good teeth in children imply that substances of high nutritive value were supplied to the child and undoubtedly exerted beneficial effects on other parts of the body as well as on the teeth.

A high resistance against infectious diseases of the respiratory tract is another indication of good nutrition.

Other conditions that suggest good nutrition are: normal color of the mucous membrane and of the skin; bright eyes and an alert expression. Dull lusterless eyes, pallor, bad posture, listlessness and an anxious expression are often due to the combined influence of malnutrition and overfatigue.

CONDITIONS THAT PROMOTE GOOD NUTRITION

Obviously a well-selected diet is essential for normal development. Other factors, however, are powerful allies. One of the conditions most favorable to good nutrition in children is a sufficient amount of sleep.

Sleep. Children need many hours of sleep. The very young baby sleeps 20 hours in 24. As he grows older the amount of sleep he needs becomes gradually less, but all during the period of growth, attention must be devoted to sleep as one of the dominant requirements for good health. Sufficient sleep helps to produce a good appetite, which in turn is essential for good nutrition. Sufficient sleep also helps to produce stability in the nervous system.

The characteristics of a well-rested child are: good color, good posture, clear lustrous eyes, an alert expression and the absence of

"lines" in the face. The teacher should make a special effort to establish among children the practice of going to bed early. The following sleep schedule is recommended: school children under the age of seven years should be asleep no later than 7 o'clock; children between the ages of seven and nine years should be asleep no later than 8 o'clock and children between nine and 12 years should be asleep no later than 9 o'clock. Ten o'clock is a good time for high school pupils. Undernourished children should retire one hour earlier. Quiet, well-ventilated sleeping rooms are important for restful sleep.

Lack of sleep leads to the condition known as overfatigue. Its consequences are baneful because its prevalence and dangers are so little realized by parents and teachers. Children themselves do not seem to be acutely conscious of fatigue; they will play until they are almost exhausted. Late hours, because of attendance at evening entertainments, because of social engagements, because of the desire of parents to take the children with them when motoring in the evening, because sometimes of excessive assignments of home lessons, invariably produce overfatigue. Thousands of school children are its victims. It expresses itself in some boys and girls as listlessness; in others, as a nervous excitability. Overfatigue reveals itself also in another way, a way which has been little understood by the layman. A lack of appetite is one of the most injurious results of overfatigue. Seldom does the mother see a causal relationship between late hours the night before and the absence of appetite for breakfast the next morning. Because of continued fatigue during the day, the poor appetite persists, and little food is eaten for the noon and the evening meal. This deplorable condition is chronic among many school children.

Freedom from physical defects. Some children are handicapped in their development by physical defects. It is the work of the school medical inspector to discover these defects. Their correction requires an understanding on the part of the parents of their seriousness and a willingness to have them treated. It is in this connection that the school nurse is able to render such valuable service. Because of her association with the doctor at the time of the medical examination, she is familiar with the defects discovered and is prepared to explain to the parents the desirability of providing corrective treatment. The classroom teacher should use her influence also to have the treatment recommended by the doctor carried out. While the teacher's powers of observation

should be trained to watch children for signs of unfavorable conditions, she must remember that it is not within her province to diagnose. Only the physician is qualified to make a diagnosis.

There are many different kinds of physical defects found among children. A few are mentioned here: adenoids and enlarged or diseased tonsils; diseases of the ear—often a consequence of adenoids and diseased tonsils; decayed and abscessed teeth; defective vision resulting in frequent headache and sometimes nausea; postural defects including fallen arches (flat foot). For these and for all other defects, it is the physician who decides when and what treatment is desirable. The teacher is no better qualified to prescribe treatment for physical defects than she is to diagnose them.

Mental hygiene. Parents with good intelligence and emotional stability create a calm home atmosphere that is conducive to the development in children of good mental and physical health. Good judgment, a sane philosophy of life, a tranquil disposition, quiet unemotional voices on the part of parents, and regularity in all the domestic processes are powerful contributors to good mental health in children.

Conditions in some homes, however, exert a harmful influence. Overcrowding, poverty, broken families, the absence from the homes of mothers in industry, the lack of training in household management of some mothers who remain at home give rise to conditions that are inimical to good health. Moreover, the nervous strain produced in a young child by a nagging father or mother, or by older brothers and sisters who pitilessly tease him tends to depress his vitality.

CHARACTERISTICS OF AN ADEQUATE DIET

Before the nutritive requirements of children are expressed concretely, the characteristics of an adequate diet should be discussed. A diet should satisfy the requirements for energy, proteins, mineral substances and vitamins. The food selected should be adapted to the digestive capacity of the individual and should be such as will help to develop the digestive tract.

The energy (calorie) requirement. Energy is the power to do work. The body is constantly expending energy in the work involved in the beating of the heart, the lifting of the chest muscles in breathing, the muscular movements expended in digestion, the maintenance

of the muscles in a state of "tone" and in all voluntary muscular movements such as walking, playing, working etc. One of the fundamental laws of physics is that energy may be transformed but can not be created. The body, therefore, can not create the energy it uses; the energy must be supplied to it. Enough food should be eaten daily to equal the energy expended by the body. In the absence of the necessary amount of food, the body draws on its own substance to supply the deficit. A loss in weight results. Children may be undernourished because their food does not supply enough energy.

Building materials. The diet must supply body-building materials as well as energy. The most important body-building substances are the mineral elements and the proteins. Mineral elements are as necessary for cell construction as is protein — a fact that has not received due emphasis. The mineral elements needing most careful consideration in food selection are calcium, phosphorus and iron.

Calcium. Although calcium is found principally in the bones and teeth, it is an essential constituent of the blood and of the cells. As many foods are poor in calcium, the choice of food for calcium can not safely be left to chance. Milk, buttermilk, skimmed milk and cheese are all very rich sources of calcium. To illustrate the high content of calcium in milk in comparison with some other foods the following table is presented:

*Quantities of Foods Necessary To Yield the Same Amount of
Calcium Found in One Quart of Milk*

3½	pounds oatmeal (14 cups measured uncooked) or
23	pounds meat or
28	pounds white rice or
3.8	pounds spinach or
4.6	pounds carrots or
18.2	pounds potatoes or
34 to 38	eggs

For children milk is the most practical source of calcium.

Phosphorus. Phosphorus is widely distributed in the body: by weight the greater part of the phosphorus is found in the bones and teeth; it is also found in the muscles, organs, nervous system and blood.

From a list of about 200 foods the following have the highest percentage of phosphorus in their edible portions. They are arranged in order of their descending values.

Cheese	Dried sweet corn	Dried currants
Egg yolk	Graham flour	Corn meal
Dried kidney beans	Walnuts	Pearled barley
Dried white beans	Hazelnuts	Eggs
Almonds	Dried lima beans	Macaroni
Dried lentils	Pecan nuts	Raisins
Entire wheat	Shredded wheat	Fresh peas
Dried peas	Entire wheat flour	Brussels sprouts
Peanuts	Buckwheat flour	Dried figs
Oatmeal	Graham bread	Dried prunes
Entire rye	Brown rice	

The whole cereals constitute an inexpensive source of phosphorus, whole wheat bread having twice as high a phosphorus content as white bread; oatmeal is three times richer in phosphorus than farina. Dried beans and peas are also an inexpensive source of phosphorus.

Iron. Iron in the body is found principally in the blood. It serves as a carrier of the oxygen, which oxidizes the foodstuffs and releases energy. The yolk of an egg has a higher percentage of iron than has any other food.

From a list of about 200 foods the following have the highest percentage of iron in their edible portions. They are arranged in order of their descending values.

Egg yolk	Entire barley	Dried sweet corn
Liver	Entire rye	Dandelions
Dried lentils	Almonds	Pecan nuts
Molasses	Oatmeal	Dried currants
Dried kidney beans	Spinach	Walnuts
Dried white beans	Eggs, whole	Raisins
Dried lima beans	Beef, lean	Fresh lima beans
Dried peas	Dried dates	Peanuts
Entire wheat	Dried figs	Potatoes
Oysters	Dried prunes	Fresh string beans
Hazelnuts	Olives	Cabbage

Notice is called to the fact that there are foods whose iron content has not generally been appreciated. While egg yolks have a higher

percentage of iron than any other foods, the following foods in the amounts specified contain as much or more iron than one egg yolk:

Foods Containing as Much or More Iron Than One Egg Yolk

- 1 potato
- 2 tablespoons dried peas or dried beans — measured uncooked
- $\frac{1}{3}$ cup baked beans
- $\frac{1}{2}$ cup oatmeal — measured uncooked
- 3 figs
- 6 prunes
- 8 dates
- 1 tablespoon molasses (not corn syrup)
- $1\frac{1}{3}$ cups string beans
- 5 small carrots (3"–4" long)
- $\frac{2}{3}$ cup canned corn

It is probable that other minerals in addition to iron are necessary to increase the iron content of the blood. Liver has been demonstrated to be especially potent.

Obviously calcium, phosphorus and iron should be liberally supplied during the period of growth. Unless the diet is selected with care there is a danger of an insufficiency of these mineral substances.

Protein. Protein is essential for the construction of cells. It is therefore necessary for the maintenance of cell life and for the building of new tissues. While muscular work does increase the energy requirement, it does not increase the protein requirement to any extent. There are many different kinds of proteins in foods, some having higher biological value than others. In the average mixed diet in this part of the country a protein deficiency is not common; in fact many diets contain much more protein than is needed.

Vitamins. In addition to the requirements for energy, mineral elements, protein and water, the need for vitamins must be met. The investigation of the presence of vitamins in food and the attempt to discover their functions in the body form an interesting chapter in the study of nutrition. Each year brings added information about the influence and importance of these substances. It is now known that certain diseases are caused primarily not by bacterial infection but by vitamin deficiencies. Moreover, certain vitamins seem to be necessary for the construction of sound teeth and for a high resistance to diseases of the lungs. Attention to the presence of the vitamins in the diet is necessary because the body seems to be unable to synthesize them: it is dependent on the food for its supply.

Information about the requirements for vitamins has been obtained by feeding experimental animals with diets having a known deficiency. Guinea pigs, pigeons, chicks, dogs, rats and monkeys have been used. There are two advantages when small animals serve as subjects. Because of their relatively short life span, the effect of inadequate diets on successive generations may be observed in a comparatively short time. Again, the preparation of experimental diets is costly in time and in money. Much more extensive observations may be conducted on animals whose food requirements are small than on animals as large as the cow and the horse.

Vitamin A. Animals fed on diets adequate in other respects but lacking vitamin A sooner or later suffer a loss of weight. The time that elapses before the loss of weight begins varies according to the amount of vitamin A previously stored in their bodies. Vitamin A is one of the vitamins that may be stored. As the diet deficient in vitamin A is continued, the animals generally develop symptoms of xerophthalmia, an inflamed condition of the eyes and the eyelids. This disorder is characteristic of a diet deficient in vitamin A. The condition is relieved when vitamin A is added to the food. Xerophthalmia has developed among children in countries where vitamin A is commonly lacking from the diet. It has been found in Japan in sections of the country where the diet was low in vitamin A. During the World War, when the food shortage was most acute in Rumania and Austria, xerophthalmia appeared among the children. It also developed in Denmark.

Xerophthalmia is not the only result of a shortage of vitamin A. A lowered resistance to diseases of the lungs and increased susceptibility to infection in the ears and in the sinuses are additional consequences of diets deficient in this vitamin. Moreover, a lack of vitamin A together with an insufficient amount of vitamins C and D and of calcium leads to the formation of unsound teeth.

Milk, butter, cream, egg yolk, liver, cod liver oil, carrots and the leafy vegetables are excellent sources of vitamin A. Tomatoes, sweet potatoes, peas, string beans, hubbard squash and kidney are good sources of it. Muscle cuts of meat and refined cereal are very deficient in vitamin A, probably containing none at all or only traces of it.

Vitamin B. Vitamin B, which also promotes growth, has a profound influence upon the nutrition of the nervous system. The effect of a deficiency of vitamin B upon the nervous mechanism is strikingly shown when pigeons are fed exclusively on polished rice. A loss of weight is followed in about three weeks by the loss of power to walk or to fly. The pigeons are suffering from avian polyneuritis.

If their diet had consisted of whole rice instead of polished rice, this disease would not have developed. Whole grains contain a substance designated as vitamin B, which cures and prevents polyneuritis. Among human beings a lack of this vitamin produces a disease called beriberi. It is prevalent among people whose diet consists largely of polished rice. The disease has also been found in Labrador and Newfoundland where the diet consisted too largely of white flour. The disease develops in from six to eight weeks in human beings and is characterized by loss of appetite, loss of weight and finally by paralysis; edema may or may not be present. That this disease was due to a dietary deficiency was not known until a comparatively recent date. When the American soldiers were stationed in the Philippines, more than 600 cases of beriberi developed among them in one year. The United States Army Medical Commission in the Philippines ordered that in the army rations, unpolished rice take the place of polished rice and that a small quantity of beans be included. The disease was eradicated in a short time.

It is interesting to note that vitamin B also exerts a very direct influence on the appetite, increasing the appetite when it is abundantly present in the diet. Its favorable influence upon the appetite may be due to the fact that this vitamin helps to maintain the digestive tract in good condition.

Spinach, tomatoes and beans (kidney, navy and soy beans) are excellent sources of vitamin B. Peas, whole cereals, meat, nuts, oranges, lemons, grapefruit, tomatoes, milk and many vegetables are also good sources of it. The fats and granulated sugar contain none.

Since this vitamin is soluble in water, a considerable part of it may be lost if the water in which the food has been cooked is not utilized. This water should be used in making soup and in white sauce. Baking soda (saleratus) should not be used in cooking vegetables, as it has a destructive effect on vitamin B.

It is now believed that the effects previously ascribed to vitamin B are due to two or more substances. For the sake of simplicity, however, vitamin B is here treated as one entity, the effects of the two substances being included under the one name—vitamin B. The body can not synthesize vitamin B; only one of the factors of the vitamin B complex may be stored.

Vitamin C. Absence or insufficiency of vitamin C in the diet leads to scurvy. [The guinea pig has been used as the subject in many experiments to study scurvy as it is especially susceptible to this disease. If healthy young guinea pigs are fed a diet lacking vitamin C, a loss of weight ensues. In a short time the teeth become

loose, the bones fragile and the joints become swollen and painful. After a period of 26 days some of the animals will have died; after 34 days all the animals will be dead. A small amount of orange juice or tomato juice in the diet would have prevented entirely the development of this disease, and if administered in time after the appearance of the symptoms, would have cured it. Scurvy among infants is occasionally met in medical practice, and is caused by a deficiency of vitamin C in the diet. The child's joints are tender; he cries when he is picked up; his gums have a hemorrhagic appearance. The disease is preventable and curable by the inclusion in the diet of foods rich in vitamin C. While scurvy in its acute form is now rarely found in human beings, in a latent or subacute form it is probably more prevalent among school children than was formerly believed. An eminent American authority on scurvy states that in his opinion conditions sometimes found in school children which are diagnosed as malnutrition, are in reality scurvy in a latent or subacute form.

As the body can neither store nor synthesize vitamin C, it is dependent on the daily supply of it in the food. This vitamin is found abundantly in oranges, lemons, grapefruit, and tomatoes, fresh and canned. In such foods as these vitamin C is stable. In many other foods, however, this vitamin is unstable, being wholly or partly destroyed by the changes which take place when the food is cooked. The amount of destruction of vitamin C depends not only on the temperature used in the cooking process but also on the duration of the time of heating. Obviously foods should be cooked only as long as is necessary. Baking soda (saleratus) should not be used in cooking vegetables as it hastens the destruction of vitamin C. Potatoes, cabbage and some other vegetables whose cooking requires only a short time still retain when cooked important quantities of their vitamin C content. Potatoes because of the large amounts used, constitute a very practical source of vitamin C, especially in the diet of the poor. Since the destruction of vitamin C is believed to be due to oxidation, the exclusion of air in the commercial canning process protects vitamin C to a large extent in these products. Vitamin C is generally destroyed when foods are dried. (Certain brands of dried milk where a special process is used are an exception to this statement.) Cereals, flour, dried dates, dried figs, dried apples, dried prunes contain none of this substance. Aging also affects adversely the vitamin C content of most foods: young carrots, for instance, have more vitamin C than old carrots contain. Sugar and fats contain none.

Vitamin D. Rickets, which is essentially a defective development of the skeletal tissues of the body, is very common among young children, especially in this climate. The possible effects of this disease are many. It may result in a narrow chest, causing the so-called "pigeon breast," a condition which naturally produces a compression of the lungs. It has been observed frequently that rachitic children are very susceptible to respiratory diseases. In addition, the joints may be enlarged and the lower limbs bowed. Children suffering from rickets generally have delayed dentition and irregular teeth. Moreover, the pelvis may be contracted—a serious handicap to women in maternity.

It is now known that the blood serum must carry calcium and phosphorus in suitable proportions if rickets is to be prevented. It is also known that vitamin D helps in the deposition of calcium and phosphorus in the bony structures of the body. Vitamin D, therefore, is often called the antirachitic vitamin. The richest source of vitamin D is cod liver oil, now regarded as one of the essential articles of diet for babies and young children. Egg yolk is another valuable source of vitamin D. Whole milk, butter, green vegetables and irradiated foods contain considerable quantities of this vitamin. Research work indicates that the body has the capacity to store this vitamin. There is reason to believe that vitamin D functions also in adult life.

It is interesting to note that the action of direct sunlight on the skin and the radiation of the skin by the mercury quartz vapor lamp or the carbon arc lamp have the same influence as the presence of vitamin D in the diet.

Research has demonstrated that vitamin deficiency in young animals results in a retardation in growth. Moreover, carefully controlled experiments have proved conclusively that certain diseases are caused primarily not by bacterial action but by shortage of vitamins. It must be remembered also that some diets not deficient enough in vitamins to produce these diseases may yet cause a lack of bodily vigor and lead to a lowered resistance to infection in general.

Our knowledge of the importance of vitamins is growing constantly. Efforts to discover their chemical nature are in progress in many laboratories. So many foods have been studied for their vitamin content that tables have been prepared in the textbooks on nutrition, expressing quantitatively the relative richness of these foods in the different vitamins. While our present knowledge is not sufficient to enable us to teach the vitamin requirement on any such

standardized basis as we teach the protein requirement or the calorie requirement, it does justify us in recommending a diet that has in it an abundance of foods that are rich in the different vitamins.

NUTRITIVE PROPERTIES OF THE DIFFERENT FOODS

A brief description of the nutritive properties of some common foods is presented. For the more important foods the most outstanding constituents as well as the most conspicuous defects are mentioned.¹ Since all foods supply energy, the energy value of each food is not discussed.

Milk. There are several reasons for assigning to milk the supreme place among foods for children. Its proteins have a high biological value; that is, they are readily transformed into body proteins. It contains a carbohydrate that does not ferment easily; its fat digests promptly as it is an emulsified fat. In addition, milk contains a very valuable assortment of mineral elements, which are as truly building material as is protein. The mineral substances that make milk especially important as a food are its phosphorus and its calcium. Phosphorus is more widely distributed in food than is calcium. Moreover, studies of family food consumption have indicated that there is a greater danger of a deficiency of calcium than of a deficiency of phosphorus. [The richness of milk in calcium has been explained on page 12.] So many foods are very deficient in calcium that reliance must be placed on milk as the most important source of calcium for children. The question arises as to the quantity of milk that a child should take each day. Experiments have indicated that the best storage of calcium in children is obtained on one quart of milk a day. Better storage of calcium took place on one quart than on one pint of milk a day. When quantities of milk greater than one quart were fed, however, proportionate storage of calcium was not observed. There are reasons for limiting the consumption of milk to one quart a day. Milk is also a valuable source of vitamin A and vitamin B. It also contains vitamin D and may contain vitamin C.

If the child refuses to drink milk he should have an abundance of foods in which milk has been cooked: for instance, milk soups, such as cream of potato soup, cream of celery soup, cream of pea soup, cream of tomato soup; creamed vegetables or vegetables served

¹ For a more detailed discussion of the nutritive properties of foods and for an interesting account of their commercial preparation see *Food Products*, H. C. Sherman, Macmillan.

in white sauce; pudding in which milk is used such as rice, tapioca, cornstarch pudding, junket and custard. Milk should also be used in making cocoa. By the use of these and similar dishes it is possible to conceal one quart of milk a day in a child's diet.

Milk makes high nutritive returns for its cost. It is one of the most economical foods in the diet. In families where the income is very limited, however, the quantity of milk for each child may have to be reduced to one pint. This is a concession to the exigency of the situation and is not an expression of the quantity of milk needed by the child.

Vegetables. It is impossible to describe the nutritive properties of the vegetables collectively, for there are marked differences in the various groups.

Potatoes and carrots. The potato is a tuber that is bland in flavor, nonirritating and easy of digestion. It is generally inexpensive. The textbooks have so often described it as a food consisting of starch and water that its richness in certain mineral elements has been obscured. It is especially valuable for its content of iron. A potato of average size contains as much iron as one egg. It is a good source of vitamin B and even when boiled 15 to 20 minutes is a good source of vitamin C. Potatoes should be eaten by children at least once daily. They may be served in a variety of ways — boiled, baked, creamed, scalloped and in soup, but not fried. Among the root vegetables the carrot occupies a high place. It too is a good source of iron and an excellent source of vitamin A; it is also a good source of vitamin B and C. The other root vegetables in most respects do not rank so high as potatoes and carrots. All root vegetables, however, have nutritive properties that justify their frequent use in the diet.

Leafy vegetables. Because of their superiority in many respects, leafy vegetables merit a separate classification and description. Leafy vegetables are very much richer in iron than are the roots and tubers. The green leaves are good sources of vitamin A, spinach being an excellent source; they are good sources of vitamin B; lettuce and raw cabbage are excellent sources of vitamin C. It must be remembered, however, that it is in the green leaves that vitamin A is found; the inner white leaves of the heads of lettuce and cabbage do not rank high as a source of vitamin A. Spinach is especially rich in vitamin A and vitamin B and as the number of spinach leaves in one serving of cooked spinach is large, it supplies the body with liberal amounts of these vitamins. If fresh spinach is not

available canned spinach may be regarded as a good substitute. Dandelion greens, beet tops, kale, swiss chard and Brussels sprouts are also valuable. It is desirable to use leafy vegetables several times a week.

Tomatoes. While tomatoes are classified botanically as a fruit, dietary usage associates them with the vegetables. Tomatoes, both raw and canned, are good sources of vitamin A and vitamin B and an excellent source of vitamin C. During the winter and early spring months especially in regions remote from supplies of fresh fruits and vegetables, canned tomatoes become almost an indispensable article of diet. Their color, their flavor and above all their high and varied content of vitamins rank them as a food of distinctive value.

Fruits. Fresh fruit is a very desirable article in the child's diet. It is a good appetizer and generally well liked by children. Moreover, its laxative properties give it an added value. Fresh fruit, in general, is a rich source of vitamin C. There is so much difference among the fresh fruits in their content of vitamin C, however, that they ought to be discussed individually. Not all fruits have been studied. Of those which have been studied, oranges, grapefruit, lemons and tomatoes rank highest as sources of vitamin C. Although apples, bananas and pineapples are good sources of vitamin C, they are poorer in it than oranges, lemons and tomatoes. It is desirable to serve orange juice to young children every day, and oranges or grapefruit to older children every day. If oranges and grapefruit are too expensive to be included daily in the diet, they should be used two or three times a week, and fresh apples and cooked dried fruit used on the other days.

The value of tomatoes, both raw and canned, must again be mentioned as a good source of that vitamin (vitamin C) which has given to oranges and grapefruit their preeminent position among the fruits.

Eggs. Eggs occupy an important position because of their excellent proteins, their phosphorus and their richness in vitamins A and D. In addition the large percentage of iron in eggs gives them a distinctive value. An egg a day is a desirable item in a child's diet, and when the family income permits, should be provided. The market price of eggs, however, at most seasons of the year is high. Fortunately, eggs are not indispensable, for the nutrients in eggs are found in certain other foods that are much less expensive. By very poor families the purchase of eggs for children of school age is economically unjustifiable in most seasons.

of the year. Instead of eggs a greater quantity of whole grain cereals, of legumes (beans, peas, lentils) and of the cheaper vegetables should be used.

Cereals. The cereals, as a class, are rich in several of the necessary building materials; the cereals are also an inexpensive source of energy. The grains in most common use in the United States are wheat, oats, corn, rice, barley and rye. The cereal itself is the seed of the plant on which it grows. This fact in itself is a promise of the presence of good building material, because the seed is intended to nourish the young plant until it has developed sufficiently to obtain its own sustenance. The cereals contain a considerable amount of protein. While some of the proteins in cereals are not of the highest biological value, such component parts of the complete protein molecule as are present even in the incomplete proteins are available for use, and when supplemented by proteins of greater worth—milk proteins, for example—deserve recognition. The cereals are richly supplied with phosphorus, iron and vitamin B. In the embryo of the cereal vitamin A is also found. Cereals are bland in flavor and when well cooked digest easily. The bran coats of the cereal are valuable for their stimulating effect on intestinal action. Such are the characteristics of the whole cereal, the cereal in its natural state.

In the attempt to produce a fine white flour, however, processes have been patented for removing the bran coats and the embryo of the wheat, leaving a product which is white indeed but which has lost a great deal of its valuable food constituents, including most of the vitamins originally present, a great deal of the mineral matter and all of the bran coats. It is in the interest of good nutrition, therefore, to encourage a more frequent use of whole wheat bread and of whole grain cereals. Especially should the consumption of these products be encouraged in families where the income is low and where the purchase of other foods high in phosphorus, iron and vitamin B is likely to be restricted.

Whether or not one should buy the prepared cereal is largely a question of economics. The prepared cereals may have good food properties. Pound for pound, their nutritive properties are as high as the nutritive properties of the corresponding unprepared cereals. The cost of the unprepared cereal, however, if we ignore the items of fuel and time is very much lower than the cost of prepared cereal.

Whatever the type of cereal served, it is advisable to train children to flavor their cereal with salt rather than with sugar. Sugar is undesirable because it is likely to ferment in the digestive tract.

Moreover, the sweetish taste that sugar imparts to cereals may cause children, sooner or later, to develop an aversion to cereals.

Advise the children to eat cereal every day at breakfast. A bowl of cereal and milk is a good foundation for the evening meal also. Urge them to take bread and butter at each meal.

Valuable as the cereals are, however, as an inexpensive source of certain building materials and of energy, their deficiencies disqualify them from ranking as a complete food. Their low content of vitamin A, the total absence of vitamin C, their inadequate supply of calcium and the poor quality of some of their proteins are defects that must be supplemented in the diet by foods that are more abundantly supplied with these substances. In the human diet, milk, vegetables and fruit are ideal supplements.

Meat. Meat is valuable for its proteins, phosphorus and iron. Liver is especially rich in iron and in those other substances that increase the iron content of the blood. The vitamin value of meat varies according to the part of the animal used. The liver is an excellent source of vitamin A, a good source of vitamin B and a fair source of vitamin C. The muscle cuts (chops, steaks and roasts), while a good source of vitamin B, are only a fair source of vitamin A and contain no appreciable amount of vitamin C. Although the muscle cuts have several good nutritive properties, especially protein, phosphorus and iron, they possess no magical qualities. They do not give strength in any unusual manner; neither have they any transcendent power to form "red blood." Their popularity is partly due to their strong flavor, their characteristic texture and to the unfounded belief that they are foods of extraordinary value. When all their nutritive properties are considered in the aggregate and compared with the price paid, it becomes apparent that muscle cuts do not make a high return for their cost. It is not good economy, therefore, for families with low incomes to make large expenditures for meat. On the other hand, no valid objection can be made against a moderate use of meat by healthy persons in families with adequate incomes. For small children under the age of seven or eight years, the emphasis should be placed on a liberal allowance of milk (one quart daily), an egg, vegetables and cereals rather than on meat, which if served at all should be served sparingly. Of course, meats that are rich in fat, such as pork and its derivatives, ham and sausage, should not be given at all to young children. To children above the age of eight years meat may be served once daily. In adolescence,

when growth generally takes place at a rapid rate, meat constitutes a practical source of protein, phosphorus and iron. During adolescence, however, the need for an abundance of milk, vegetables and fruit must still be remembered.

Cheese, nuts and legumes. These foods are commonly referred to as "meat substitutes." This term is objectionable because it falsely implies that meat is a necessity. The term probably arose from the fact that cheese, most nuts and legumes are rich in protein.

Cheese. Cheese has excellent nutritive properties. Cheese made from whole milk contains in concentrated form all the nutrients of the milk except those remaining in the whey. Cheese made from whole milk is therefore a rich source of proteins of high biological value; it is a good source of vitamin A; especially is cheese rich in calcium and phosphorus. Cheese made from skimmed milk contains less vitamin A than does cheese made from whole milk. It is, however, a good source of protein, calcium and phosphorus. As cheese is a very concentrated food it digests more slowly than would a more dilute food. With a liberal use of milk in a child's diet cheese is unnecessary; for young children cheese is undesirable. In the diet of adolescents and adults cheese may be regarded as a valuable food.

Nuts. Nuts present a diversity of composition. Some nuts, like the walnut and almond, are rich in protein and fat and comparatively low in carbohydrate. The chestnut, on the other hand, is low in fat and protein and high in carbohydrate. Most nuts are high in phosphorus and iron and are rich in vitamin B. Like cheese, however, nuts are concentrated and will overtax the digestive system of young children. It is safer to withhold whole nuts from children until about the eighth year of age and even then to permit their use only in small amounts, and preferably ground or made into a paste. Peanut butter, which has the valuable constituents of the peanut, is a nutritious filling for sandwiches.¹

Dried beans, peas and lentils. Beans, peas and lentils have very good nutritive properties. The beans are excellent sources of vitamin B, and the peas and lentils are good sources of vitamin B. While dried beans and peas develop vitamin C when sprouted, they are devoid of it in their dry state. Lentils, beans and peas are rich in iron and phosphorus, and carry a high percentage of protein. The valuable nutritive constituents of these dried legumes and their low price assign to them a prominent place in diets of restricted cost.

¹ Strictly speaking the peanut is a legume rather than a nut.

Sugar. The energy-yielding power of sugar is its only nutritive property. Pure sugar contains no protein, mineral elements or vitamins. It is therefore worthless as a body builder. Moreover, sugar in concentration is very irritating to the lining of the digestive tract. In addition, sugar may ferment and produce substances that cause digestive disturbance. Its flavor is so sweet that when taken between meals it dispels the appetite for the next meal. In so far as candy is made of sugar, the same criticisms may be made against it. Candy, if used at all, should be taken at the end of a satisfactory meal and then only in small amounts. Children should be taught to spend their pennies for fruit rather than for candy. Syrups and very sweet preserves contain too much sugar to be good for children.

Suitable desserts for children. 1 Simple puddings made with milk, such as rice pudding, tapioca pudding, cornstarch pudding, junket, custard etc.

2 Cooked dried fruit, such as prunes, figs, raisins, apricots.

3 Fresh fruit, raw or cooked.

These foods are diversified enough to provide sufficient variety; their excellent nutritive properties and their ease of digestion justly rank them as the best desserts for children.

Cake and puddings resembling cake in composition generally consist of sugar (devoid of building materials and vitamins) and white flour (deficient in building materials and vitamins). While milk, butter and eggs are also generally used, the amount in any one serving is small. Moreover, the icing, because sugar is its chief constituent, adds little except energy to the nutritive value of the cake. Cake is not only a very poor body builder; it is too complex in nature and contains too much sugar to be wholesome for young children. Another objection to the use of cake by children is that because of its soft texture it will be swallowed without much mastication. The cake problem is best met by withholding it entirely from children under the age of eight years, and for the next three or four years, giving, instead of cake, hard cookies in limited amounts.

Pie crust is made of fat and white flour, flavored with salt and moistened with water. The use of pie crust by children is open to two criticisms. Pie crust is a concentrated food that is rich in fat and therefore difficult of digestion. Again, lard and the vegetable fats which are the fats generally used in making pie crust are worthless for building purposes as they are devoid of protein and

mineral elements and contain little if any vitamin A and no vitamin B and C. The white flour has lost in the milling process much of its content of minerals and vitamins. The fillings used in pies, however, often have value: berries, apples, custard etc. It is therefore the filling and not the crust of pie which should be eaten by children.

When milk and eggs are present in frozen dishes, they contribute excellent building materials, and ice cream certainly constitutes an acceptable way of using these highly nutritious foods. The large amount of sugar in ice cream, however, must prohibit its frequent use by children. Ice cream should not be allowed between meals and should be used for dessert only occasionally. Because of its low temperature, ice cream should be eaten slowly.

Water. A large proportion (about two-thirds) of the body weight is water. Every cell contains water. The body fluids, blood, lymph and the digestive juices are composed largely of water. Its solvent action helps to bring the products of digestion to the cells and also to carry away several of the waste products of cell activity. Water is a factor in the regulation of body temperature.

Many foods, such as fresh fruit, vegetables and milk, carry high percentages of water. In the cooking process such dry foods as cereals and the dried legumes absorb large quantities of water. The total amount of water introduced into the body through food, however, does not furnish enough water. Some water must be taken as a beverage every day. The amount of water needed increases as the child grows older. Moreover, any activity inducing profuse perspiration, such as participation in strenuous games and sports, makes the body's requirement for water greater. It is a good practice for children in the elementary school to drink three or four glasses of water a day: this amount of water supplemented by the water in a quart of milk and in their other foods will generally be sufficient.

MENUS FOR CHILDREN OF DIFFERENT AGES

Research work in the laboratory and careful observation of dietary practices have established the belief that children will reach their highest nutritive level when the diet supplies daily those foods that have been demonstrated to be richest in building materials and vitamins and when enough food is eaten to meet the energy requirement. The following menus are planned for children of different ages and are suggestive of the types of foods that ought to be used. The quantities of foods necessary will depend on the size and activity of the child.

Menu for Children 5-7 Years Old*Breakfast*

Orange juice
Oatmeal with cream or milk
Toast
Butter
Weak cocoa (made with milk)

Dinner

Poached egg on toast
Potato
Spinach
Glass of milk
Tapioca pudding (made with milk)

Supper

Toast and milk
Thoroughly cooked prunes

Menu for Children 8-12 Years Old*Breakfast*

Orange
Oatmeal with cream or milk
Toast
Butter
Cocoa (made with milk)

Dinner

Lamb chop
Sweet potato
Cooked beet tops
Whole wheat bread
Butter
Glass of milk
Cornstarch blanc mange

Supper

Cream of celery soup
Scrambled egg
Potato
Whole wheat bread
Butter
Glass of milk
Canned apricots
Molasses cookie

Menu for Children 13-18 Years Old*Breakfast*

Grapefruit
Cracked wheat
Toast
Butter
Egg
Cocoa (made with milk)

Dinner

Roast beef, gravy
Potatoes
Glass of milk
Creamed cabbage
Fruit salad with nuts
Ice cream

Supper

Cream of tomato soup
Cheese fondu
Lettuce sandwiches
Canned berries
Sponge cake

Each menu contains approximately one quart of milk, a whole grain cereal, toast, butter, egg, potatoes, a leafy vegetable, fresh fruit (orange or grapefruit) ; the desserts are a simple pudding and canned fruit or cooked dried fruit. In the menus for the child of 13 to 18 years of age, nuts and cheese in addition to the above foods are included. Because nuts and cheese have excellent nutritive proper-

ties and because boys and girls at this age can digest them successfully, their use ought to be recommended. In these menus for the different age periods, no attempt has been made to limit the cost.

Adequate Minimum Standards

Nutritive requirements may be met, however, when cheaper foods than these are used. The best expression of adequate minimum standards has come from the New York Nutrition Council, which appointed a committee on economic standards. This committee expressed the food requirement in terms of the most economical foods and believes that any attempt to live on a lower nutritive plane than the one given would be dangerous. Its recommendations are as follows:

Weekly Diet for Children 5-12 Years Old

¹ Milk	3½ quarts
² Eggs	3
Meat or fish	0-1 pound
³ Fat	3½ ounces-1 pound
Fruit	{ 2-3 oranges
	<i>or</i>
	{ 2-3 apples
	<i>plus</i>
	{ 3-5 ounces dried fruit
Vegetables	
Green or root	2- 4 pounds
Potatoes	2- 3 pounds
Legumes and cheese	2- 6 ounces
Bread	2- 3½ pounds
Cereal	12-20 ounces
Sugar	6- 8 ounces

¹ Increase milk to 7 quarts when it can be afforded.

² Eggs may be omitted when too expensive.

³ Fat may be reduced from 1 pound to ½ or ¾ pound.

Weekly Diet for Children 12-16 Years Old

Milk	3½-7 quarts
¹ Eggs	4
Meat and fish	1-2 pounds
Fat	12 ounces-1 pound
Fruit	{ 2-3 oranges
	or
	{ 2-3 apples
	plus
	{ 3-5 ounces dried fruit
Vegetables	
Green or root	2½-4 pounds
Potatoes	2½-6 pounds
Legumes and cheese	4 -8 ounces
Bread	2½-4½ pounds
Cereal and flour	1 -2½ pounds
Sugar	8 ounces-¾ pound

SUGGESTIONS FOR TEACHING

Habits

Health habits are acquired most easily by children when they have an opportunity to practise these habits with satisfaction. The noon lunch, the midsession lunch and school parties present such opportunities, and interested teachers are utilizing them to help the children establish the habits of washing hands before eating or serving food, refraining from eating food that has fallen to the floor or that has been partly eaten by another, chewing food well, refraining from drinking liquids when food is in the mouth, learning to like the important foods.

Information

Since barriers between subjects are fast disappearing in all grades, an effort should be made to capitalize the health materials in all phases of the curriculum. The alert teacher is constantly discovering opportunities for such integration. A few suggestions are given below.

Geography. *Cereal industry.* When the children are studying the great flour-milling centers of the country, they should learn that the milling process removes much valuable body-building material

¹ Eggs may be omitted when too expensive.

from the cereals; when the rice-producing areas of the earth are being studied, the superior nutritive properties of whole or dark rice over white rice should be emphasized.

Dairy industry. When the children are studying the states where the dairy industry is well developed, they will be interested in discussing the importance of the dairy industry to the nation's health and the necessity for encouraging a liberal and clean milk supply. It is essential for rural children to realize how precious their milk supply is and that the rural family should reserve enough milk to meet its own needs and not sell all its milk to the creamery.

Gardening. Good nutrition in children and in adults demands a supply of vegetables. The contributions to health made by gardens whether in the form of the big truck gardening areas or in the form of one's own family garden will naturally form part of the discussion. The plants that produce leafy vegetables, for instance, the leafy vegetables grown at home and at a distance, the leafy vegetables fed to animals, the ways of using leafy vegetables in the human diet will form interesting topics of discussion. Root vegetables will be another topic.

Fruit growing. When the pupils are studying the fruit industry, questions regarding the nutritive value of the different fruits will usually arise and will develop into pertinent topics for investigation.

Arithmetic. Every part of the curriculum may make contributions to the health program. Even arithmetic is an ally. When the children in the upper grades are studying breakfast, for instance, they will be interested to know that the calorie (energy) value of a breakfast may be expressed concretely. By means of the following table they may calculate the calorie value of a satisfactory breakfast such as breakfast 1 below and then the calorie value of their own breakfast. The inadequacy of a meal like breakfast 2 will be apparent.

Calorie Value of Some Foods

	<i>Approximate Measure</i>	<i>Calories</i>
Orange	1 large	100
Grapefruit	$\frac{1}{2}$	100
Apple	1 large	100
Prunes	4 medium	100
Dates	3-4	100
Cooked oatmeal	about $\frac{2}{3}$ cup	100
Shredded cereals	1 biscuit	100
Prepared flaked cereals	$1\frac{1}{4}$ cups	100
Puffed cereals	$1\frac{2}{3}$ cups	100
Milk	$\frac{5}{8}$ cup	100
Toast	2 thin slices	100
Roll	1	100
Butter	1 tablespoon	100
Cocoa	1 cup (made with milk)	150
Egg	1	75

Breakfast 1

One large orange.....	100	Calories
Flaked wheat cooked, about $\frac{2}{3}$ cup.....	100	Calories
Milk, about $\frac{5}{8}$ cup for cereal.....	100	Calories
Toast, two thin slices.....	100	Calories
Butter, one tablespoon.....	100	Calories
One cup cocoa (made with milk).....	150	Calories

Total 650 Calories

Breakfast 2

One roll	100	Calories
One-half tablespoon butter.....	50	Calories
One cup tea or coffee.....	0	Calories

Total 150 Calories

One teaspoon of sugar used in the coffee would add 16 calories and three tablespoons of milk in the coffee would add about 40 calories.

The contrast between the two breakfasts is very impressive to children. The use of tea and coffee has been criticised frequently; now their worthlessness may be demonstrated mathematically.

The quantity of food needed to yield 100 calories may be expressed by weight or by measure. For instance, 1.4 ounces of prunes are needed to yield 100 calories. The number of prunes required (or the measure) will vary according to the size, four prunes of medium size being needed. The weight is a more accurate method of expressing the size of the 100-calorie portion than the measure. Since the measure, however, may be visualized so much more easily by the child than the weight may be remembered, the *measure* is the method most successfully used in teaching children. Consult Rose's Feeding the Family for the 100-calorie measure of other foods not listed here.

The relative economy of milk may be demonstrated by the following problem:

One quart of whole milk yields 675 calories.

It would require one pound lean beef *or* one pound lean lamb *or* two pounds fresh codfish *or* nine eggs to give the same amount of energy.

How many quarts of milk might be purchased for the money paid for one pound of meat? How many calories would be provided by this quantity of milk?

English. The pupils will wish to express in written form many of the facts that they have learned about food values and food production and will suggest topics like these: a visit to some local food industry; milk as a food for the family; different ways of using milk in the diet; milk as an economical food; the care of milk in the home; the dairy industry in New York State; the dairy industry in the locality.

The subject of vegetables is fertile with interesting themes, such as, the vegetables that grow in the locality; the vegetables that grow in foreign countries; the use of vegetables in feeding animals; vegetables I have learned to like; how I taught myself to eat certain vegetables.

Cereals and their products offer fruitful topics, such as the cereals grown near home; ways of using cereals in the diet; the use of cereals in feeding farm animals; bread, the food used by all nations.

CORRECTION OF MALNUTRITION

It should be the goal of each teacher to promote such good health conditions among the children that retarded development and impaired health will disappear. While that goal is an ideal that will be reached only in the future, a marked improvement in the physical condition of many school children may be effected by the teacher who is interested in health and prepared to teach it.

The supplementary milk feeding for undernourished children has helped to improve the nutritional condition of many boys and girls. The milk should be given *early* rather than *late* in the morning session; between 10 a. m. and 10.30 a. m. is the best time for it. The milk is served most conveniently when it is delivered to the school in half-pint sealed bottles. Straws are provided, through which the children sip the milk. A graham cracker or other whole-grain cracker is a desirable accompaniment to the milk. The children who can afford to pay for the milk should do so. For the needy undernourished children, funds may be obtained either by an appropriation from the board of education or from some organization interested in child welfare. A large proportion of the children will be able to pay for their milk. If it is impossible to obtain the milk in half-pint bottles, it may be ordered in larger quantities and served in paper cups. In rural schools the undernourished children may bring milk for their supplementary feeding from home.

Some children will be found whose physical condition will continue to be unsatisfactory. They are problem cases in whom one or several causes may be operating. In persistent cases of malnutrition one generally finds that physical defects, overfatigue or faulty food habits are present. Obviously medical advice and treatment should be provided for physical defects. For a child suffering from overfatigue, more hours of sleep must be urged. In addition, rest periods at home during the day should be recommended. Lying down in complete relaxation without companions, toys or books in a cool, quiet room for one hour a day has proved to be helpful in restoring many children to a better state of health. During the time of school vacation and on Saturdays and Sundays during the school year, this rest period may be easily arranged. When school is in session the rest period may be taken at intervals; a rest of 15 to 20 minutes before the noon meal and of 40 to 45 minutes before the evening meal should be the daily practice. It should be remembered that for children suffering from overfatigue, *rest* rather than *exercise* should be prescribed. It will generally be observed that as the child recovers from overfatigue, his appetite will improve.

In addition, the food habits of every undernourished child should be carefully studied. He may be omitting milk or vegetables from his diet or going to school without breakfast, or drinking tea or coffee or eating candy excessively. The advice of a discerning, sympathetic, tactful teacher will be of immeasurable value to such a child. It is hoped that teachers will soon have the consultation services of a

supervisor of health teaching in the schools, to whom they may turn for advice about such problems.

A knowledge of home conditions is essential for corrective work of this kind. No teacher even in the name of health should make demands which the child is unable to carry out, nor blame him for conditions over which he has no control. By injudicious methods zealous reformers may inflict serious injury to the personality of a sensitive child. The teacher who understands the home limitations as well as the home possibilities for health improvement in the under-nourished child will be the one who can most successfully obtain his confidence and cooperation.

NUTRITIVE REQUIREMENTS OF TEACHERS

Yearly medical examination. Before one can safely plan a dietary regimen or even a program of recreation, one should first have a thorough medical examination by a competent physician. This examination should be repeated at least once a year. "Be examined on your birthday" is a commendable rule to follow. Conservation of health depends first on an understanding of one's physical condition and then on the adoption of a mode of living consistent with that condition. The following dietary suggestions are intended for those persons found to be in a satisfactory state of health.

While the importance of suitable food in childhood is rapidly gaining recognition, the necessity of an intelligent choice of food in adult life has not generally been realized. At maturity the body does not enter into a state of chemical composition that is stable and fixed; its substance varies with the quality and quantity of food eaten. The storage of fat may vary within wide limits. The body is constantly expending energy. When the body receives more food than it needs for energy, a storage of body fat takes place; when the daily food does not provide a sufficient amount of energy, its deposits of fat will be broken down to supply the deficit. Moreover, even when the body receives enough food for energy, it undergoes a daily loss of nitrogen, calcium, phosphorus, iron and other mineral substances. Unless the food eaten supplies these elements in sufficient quantities, there will necessarily be a depletion of them in the body structure. In addition, the body in maturity as in childhood requires vitamins for the maintenance of health. The importance of the vitamins has been discussed on pages 14-19. Experiments indicate that the body must receive the vitamins in the food, for it can not synthesize them. Although the body may store vitamin A and vitamin D, it can not store vitamin B

and vitamin C and is dependent on the daily food intake for them. While a much wider choice of foods is possible among grown people than among young children, variety itself will not necessarily guarantee an adequate diet. Care must be taken that the foods rich in building materials and in vitamins be included daily in the diet. One pint of milk, two or three vegetables and some fresh fruit constitute the best foundation for the daily diet of the adult. To these foods an egg, cereal, bread and butter, meat, fish, nuts or cheese may be regarded as good additions.

The total amount of food required depends largely on the energy expended by the body. It is not necessary, however, for the average person to "count the calories" in order to make certain that enough energy is being supplied. Excess protein, fat and carbohydrate are stored as body fat, and a storage or depletion of body fat is reflected in gain or loss of weight.

WEIGHT TABLES FOR MEN AND WOMEN

MEN			WOMEN		
<i>Height</i>		<i>Weight</i>	<i>Height</i>		<i>Weight</i>
<i>ft.</i>	<i>in.</i>	<i>lbs.</i>	<i>ft.</i>	<i>in.</i>	<i>lbs.</i>
5	0	126	4	8	112
5	1	128	4	9	114
5	2	130	4	10	116
5	3	133	4	11	118
5	4	136	5	0	120
5	5	140	5	1	122
5	6	144	5	2	124
5	7	148	5	3	127
5	8	152	5	4	131
5	9	156	5	5	134
5	10	161	5	6	138
5	11	166	5	7	142
6	0	172	5	8	146
6	1	178	5	9	150
6	2	184	5	10	154
6	3	190	5	11	157
6	4	196	6	0	161
6	5	201			

These are the tables used by the Life Extension Institute in its physical examinations of men and women. The tables of weight for women include clothing; the tables of weight for men include clothing except coat and vest. These weight tables represent the ideal weights for the different heights at the age of 30 years. Adults are advised to try to keep throughout life the weight they ought to have at the age of 30 years.

SUGGESTIONS FOR INCREASE OF WEIGHT

If your weight is much below the standard weight and your medical examination has indicated no pathological condition as the cause, you ought to try to increase your weight by the following

means: (1) increasing your food intake; (2) decreasing your muscular exercise; (3) increasing your hours of sleep.

Increasing your food intake. An additional potato will add 100 calories to your diet and an extra tablespoon of butter will give another 100 calories. If you are not eating cereal for breakfast, include a dish of it ($\frac{2}{3}$ cup cooked cereal or $1\frac{1}{4}$ cup corn flakes or $1\frac{1}{2}$ cup puffed cereal) and receive 100 calories. One-quarter cup thin cream will yield still another 100 calories. To your luncheon add four medium sized dates and gain another 100 calories; one tablespoon of peanut butter with two thin slices of bread will supply 200 calories. Unless the previous diet has been very deficient, an increased intake of 600 calories a day above that formerly eaten will generally result in a gain in weight. Be careful not to overtax the digestive system by excessive amounts of food. A gradual steady gain in weight is better than a rapid increase.

Decreasing your muscular exercise. As far as is consistent with the maintenance of a good appetite, decrease your muscular exercise. When the energy expended is less than the energy value of the food eaten, the excess food (protein, fat and carbohydrate) is stored as fat. Decreasing the expenditure of energy leaves more food available for storage.

For example:

Case 1

2500 calories taken in food

2500 calories expended

0 Left for storage

Case 2

2500 calories taken in food

2100 calories expended

400 The food equivalent of 400 calories is available for storage.

If the daily diet is now increased by 600 calories as suggested in the previous paragraph there will be the food equivalent of 1000 calories available for increase in weight. Less vigorous exercise, less time spent in exercise, sitting more and standing less, lying down for one to two hours daily, are all means of reducing the energy expenditure of the body.

Increasing your hours of sleep. The body spends less energy during the sleeping hours than it does during the waking hours. An increase in the number of hours spent in sleep will therefore reduce

the amount of energy expended by the body. Moreover, the recuperative value of sleep helps to keep the nervous system in better condition and often results in a keener appetite.

Reducing the energy expenditure of the body and increasing the intake of food are the best methods of increasing the weight. Avoid underweight if you are a young adult. Mortality statistics indicate that in young persons underweight is an unfavorable condition.

SUGGESTIONS FOR DECREASE OF WEIGHT

If your weight is markedly above the standard weight for your age and height it is generally advisable to reduce your weight. One should be most cautious about the method followed. Avoid the much advertised commercial preparations for the reduction of weight. A gradual loss in weight produced by a wisely selected diet with perhaps an increase in exercise is the only safe procedure. Serious injury to health will result from injudicious limitation of food. It must be remembered that even when a loss of body weight is sought, the requirements for protein, mineral matter, vitamins and bulk continue and the foods upon which we rely for these substances must be retained in the diet. It is essential that the diet still supply daily one pint of milk, two or three vegetables (leafy vegetable four or five times a week) and fresh fruit. On the other hand, there are foods in common use which are poor sources of the nutrients mentioned above and which may safely be used in smaller quantities or omitted altogether, such as

Sugar and its related products	{	Candy
		Syrup
		Pudding sauces in which sugar is
		a large ingredient
		Jam
		Jelly
White flour and its products	{	Rich preserves
		White bread
		Cake
		Pie crust
		Pastry
		Biscuit
		Dumplings
		Macaroni
		Spaghetti
		Vermicelli
	{	Crackers made from white flour

and other highly milled cereals such as white rice. Olive oil and salad dressing should also be omitted.

Increased exercise will help to reduce weight. The approval of your physician, however, should be obtained before you undertake any system of exercise.

Suggested Menu for Reduction of Weight in Adults

Breakfast

Fresh fruit, 1 orange, $\frac{1}{2}$ grapefruit or 1 apple
1 thin slice of toast
Beverage — usual beverage — milk but no sugar

Luncheon

1 cup bouillon or other clear soup
2 scrambled eggs
1 slice Boston brown bread
Large lettuce salad (dressing to consist of fruit juice or vinegar; no oil)
1 glass milk
2 stewed figs
1 graham cracker

4 p. m.

Tea with lemon

Dinner

Meat (without gravy) or fish
Large serving of spinach flavored with lemon
1 glass milk
1 slice whole wheat bread
 $\frac{1}{2}$ cup orange ice
2 ladyfingers

This menu will yield 1200–1300 calories, leaving a deficit of 1500–1700 calories to be supplied by the breaking down of body fat. A loss in weight should be the result.

While overweight may be merely an inconvenience in young persons, mortality statistics indicate that in those who have reached or passed the period of middle life, overweight is a decidedly unfavorable condition. Middle-aged adults, therefore, should guard against an excessive weight. Calorimeter experiments prove that after middle life the energy requirement is measurably less. If the quantity of food consumed continues to be as large as it was 20 years

before, an increase in weight is inevitable. It is well to be aware of this possibility and as middle age approaches to avoid overweight by a judicious restriction of food.

THE MAINTENANCE OF GOOD DIGESTION

Whether one's weight is normal or abnormal, one should always try to keep the digestive tract in a healthy condition. Good digestion is dependent on a normal secretion of digestive juices and a normal motor activity of the stomach and intestines. To maintain these conditions under the stress and strain of modern living is not easy. Physical exercise, mental calmness, regularity of meals and a carefully chosen diet are essential for good hygiene in the digestive system. Excessive sweets and excessive amounts of fat should be avoided. Salivary digestion and gastric digestion are depressed by fatigue, severe heat, or severe cold, delayed meal time and disturbed mental states such as extreme joy, anger, anxiety etc. Some attacks of indigestion might be avoided if, under these circumstances, one refrained from eating a heavy meal. If one suffers from frequent or chronic indigestion he should seek medical advice.

There is a digestive disturbance common among sedentary workers, a condition that may have serious effects — constipation. Lack of exercise and too highly refined foods tend to produce this condition. The day's routine should include a regular time for defecation. In addition, care should be taken that the diet supply foods containing those substances that promote activity of the intestines. These substances in general may be divided into two classes: indigestible materials (cellulose and seeds) and organic acids. The following lists of foods indicate good sources of these substances.

Foods Rich in Cellulose or Seeds

Celery	Beans	Figs
Asparagus	Peas	Raisins
String beans	Lentils	Dates
Parsnips	Pineapple	Prunes
Carrots	Rhubarb	Whole cereals
Cabbage	Tomato	Bran
Spinach	Berries	

Foods Rich in Organic Acids

Lemon	Rhubarb	Pineapple
Grapefruit	Tomato	Apple
Orange		

Menu for the Correction of Constipation in Adults

About one half hour before breakfast, *two or more* glasses of water.

Breakfast

Grapefruit or orange

Oatmeal (one tablespoon of bran cooked with the oatmeal) with milk
or cream

Whole wheat bread and butter

Beverage

Luncheon

Cream of tomato soup

Asparagus salad or celery salad or fruit salad

Boston brown bread and butter

Rice pudding with raisins

Dinner

Meat or fish or eggs

Celery

Baked potato (the skin eaten also)

Parsnips

Glass of milk

Boston brown bread or bran muffins

Sliced pineapple or stewed figs

Oatmeal macaroons or graham crackers



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